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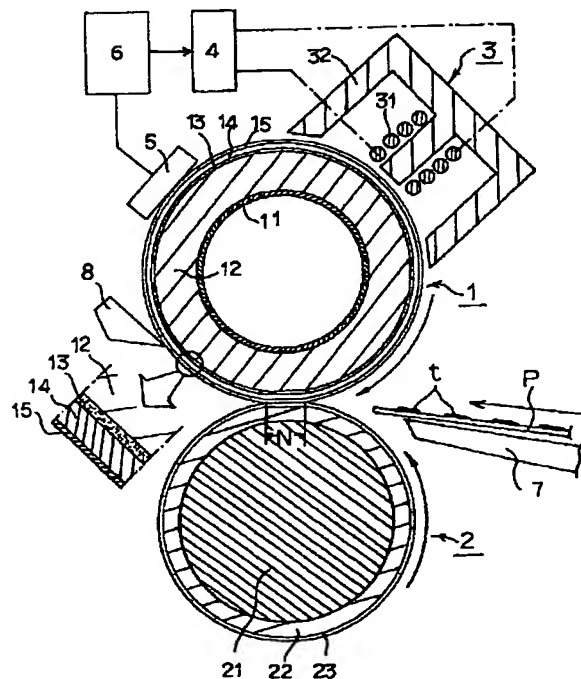
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(54) 【発明の名称】 定着装置及び画像形成装置

(57) 【要約】

【課題】 相互圧接させた定着ローラ1と加圧ローラ2とを有し、磁束発生手段3の発生磁束によって定着ローラを加熱し、上記両ローラ1・2の圧接ニップ部Nで未定着像tを担持した記録材Pを挟持搬送して未定着像を記録材に熔融定着させる電磁誘導加熱方式の定着装置について、ハロゲンヒータを用いた熱ローラ方式の定着装置と同等あるいはそれ以上の効率を得られ、迅速に立ち上がる、マイクログロスの発生がなく、OHTのような定着ローラに巻き付きやすいメディアに対しても、十分な分離性能を確保できる等の特長を具備させること。

【解決手段】 定着ローラ1は内側から外側に順に、支持層11、スポンジ層12、電磁誘導発熱性層13、弾性層14、離型層15の少なくとも5層から構成され、磁束発生手段3は定着ローラ1の外側に配置され、定着ローラと加圧ローラがスリップしない手段(G4~G8、44)を備えたこと。



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【特許請求の範囲】

【請求項1】 互いに表面で圧接されていて自由に回転できる定着ローラ及び加圧ローラとを有し、磁束発生手段の発生磁束によって定着ローラに設けた電磁誘導発熱性層を発熱させ、定着ローラと加圧ローラとの圧接ニップ部で未定着像を担持した記録材を挾持搬送して未定着像を記録材に熔融定着させる電磁誘導加熱方式の定着装置であり、
定着ローラは内側から外側に順に、支持層、スポンジ層、電磁誘導発熱性層、弾性層、離型層の少なくとも5 10層から構成され、
定着ローラと加圧ローラがスリップしない手段を備えたことを特徴とする定着装置。

【請求項2】 定着ローラと加圧ローラがスリップしない手段が、定着ローラの回転力を加圧ローラに伝達する伝達系と、その伝達系に介在させた逆回転を防止するワンウェイギアであることを特徴とする請求項1に記載の定着装置。

【請求項3】 磁束発生手段は定着ローラに対向させて定着ローラの長手方向に沿わせて配設してあることを特 20徴とする請求項1又は2に記載の定着装置。

【請求項4】 磁束発生手段は励磁コイルと磁性体コアであることを特徴とする請求項1ないし3の何れかに記載の定着装置。

【請求項5】 磁性体コアを定着ローラに対向させて定着ローラの長手方向に沿わせて配置し、励磁コイルは定着ローラの長手方向に渡って巻き線してあることを特徴とする請求項4に記載の定着装置。

【請求項6】 記録材に未定着像を形成する作像手段と、記録材に形成担持させた未定着像を記録材に熔融定 30着させる定着手段を有する画像形成装置において、定着手段は請求項1ないし5の何れかに記載の定着装置であることを特徴とする画像形成装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は記録材（メディア）上の未定着像を熔融定着（加熱定着）する電磁誘導加熱方式の定着装置（定着器）、該定着装置を具備した画像形成装置に関する。

【0002】

【従来の技術】従来、複写機・プリンタ等の画像形成装置において、電子写真プロセス・静電記録プロセス等の適宜の作像プロセス手段により転写方式あるいは直接方式で記録材上に形成担持させた未定着像（樹脂・磁性体・着色料等からなる加熱溶融性の顔面剤（トナー）の像）を記録材に熔融定着する定着装置としては熱ローラ方式の装置が汎用されている。熱ローラ方式の定着装置は互いに圧接・回転している定着ローラ（熱ローラ）と加圧ローラとの圧接ニップ部（定着ニップ部）で未定着トナー像を担持させた記録材を挾持搬送しながら熱と圧 50

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力を加えることで未定着トナー像を熔融定着せしめるもので、熱ローラである定着ローラを加熱する手段として、定着ローラに熱源としてハロゲンランプを内蔵させ、該ハロゲンランプで定着ローラを内部から加熱して、定着ローラ表面の温度を定着に適当な温度に温調するものが一般的であった。

【0003】熱ローラである定着ローラを加熱する他の手段として、励磁コイルによる磁束で定着ローラ内面に設けた導電層に渦電流を発生させてジュール熱により導電層を発熱させ、その発熱により定着ローラを加熱するようにした電磁誘導加熱方式の定着装置が提案されている。

【0004】この電磁誘導加熱方式の定着装置は熱発生源をトナー像のごく近くに置くことができるので、ハロゲンランプを用いた定着装置に比して、定着装置起動時に定着ローラ表面の温度が定着に適当な温度になるまでに要する時間が短くできるという特徴がある。また熱発生源からトナー像への熱伝達経路が短く単純であるため熱効率が高いという特徴もある。

【0005】カラー複写機用定着ローラや高速白黒複写機用定着ローラは、芯がねとして肉厚3mm以上のアルミシリンダ（アルミニウムシリンダ）製を用い、この芯がね上層に500 μ m以上の弾性層を設け、芯がね内部に励磁コイルを設けて該励磁コイルの発生磁束で該芯がねを電磁誘導発熱させ、芯がね自身の大きな熱容量を利用し、連続通紙時の定着ローラの温度低下を緩和するとともに、上層に存在する弾性層の効果によって、画像上の微小な光沢むら（マイクログロス）の防止や、黒のしっとり感を出させる効果をもっている。

【0006】

【発明が解決しようとする課題】しかしながら、上記従来例の様な定着ローラ内部に励磁コイルを設けた電磁誘導加熱方式の定着装置において、アルミ芯がねで効率良く熱を発生させるためには磁束を狭い領域に集中させ密度の大きな誘導電流を流しても、効率のよい発熱は得られず（アルミは透磁率 μ が低いので表面抵抗 R_s が小さく発熱しにくい）、また磁束発生手段としての励磁コイル・磁性体コアを定着ローラ外部に配設する構成を選択した場合には、定着ローラの弾性層の存在により、コイル・コア間のギャップが大きくなって、芯がねまでの距離が遠くなり、即ちコイル・コアと定着ローラ芯がね間の距離が遠くなり、ハロゲンヒータ並みの発熱効率を得ることが出来なかった。

【0007】そこで本発明の目的は、ハロゲンヒータを用いた熱ローラ方式の定着装置と同等あるいはそれ以上の効率が得られ、迅速に立ち上がる、マイクログロスの発生がなく、OHTのような定着ローラに巻き付きやすいメディアに対しても、十分な分離性能を確保できる等の特長を具備させた電磁誘導加熱方式の定着装置を提供することにある。

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【0008】

【課題を解決するための手段】本発明は下記の構成を特徴とする定着装置及び画像形成装置である。

【0009】(1) 互いに表面で圧接されていて自由に回転できる定着ローラ及び加圧ローラとを有し、磁束発生手段の発生磁束によって定着ローラに設けた電磁誘導発熱性層を発熱させ、定着ローラと加圧ローラとの圧接ニップ部で未定着像を担持した記録材を挾持搬送して未定着像を記録材に熔融定着させる電磁誘導加熱方式の定着装置であり、定着ローラは内側から外側に順に、支持層、スポンジ層、電磁誘導発熱性層、弾性層、離型層の少なくとも5層から構成され、定着ローラと加圧ローラがスリップしない手段を備えたことを特徴とする定着装置。

【0010】(2) 定着ローラと加圧ローラがスリップしない手段が、定着ローラの回転力を加圧ローラに伝達する伝達系と、その伝達系に介在させた逆回転を防止するワンウェイギアであることを特徴とする(1)に記載の定着装置。

【0011】(3) 磁束発生手段は定着ローラに対向させて定着ローラの長手方向に沿わせて配設してあることを特徴とする(1)又は(2)に記載の定着装置。

【0012】(4) 磁束発生手段は励磁コイルと磁性体コアであることを特徴とする(1)ないし(3)の何れかに記載の定着装置。

【0013】(5) 磁性体コアを定着ローラに対向させて定着ローラの長手方向に沿わせて配置し、励磁コイルは定着ローラの長手方向に渡って巻き線してあることを特徴とする(4)に記載の定着装置。

【0014】(6) 記録材に未定着像を形成する作像手段と、記録材に形成担持させた未定着像を記録材に熔融定着させる定着手段を有する画像形成装置において、定着手段は(1)ないし(5)の何れかに記載の定着装置であることを特徴とする画像形成装置。

【0015】〈作 用〉

a) 定着ローラの層構成を内側から外側に順に、支持層、スポンジ層(発泡体層)、電磁誘導発熱性層、弾性層、離型層の少なくとも5層から構成し、磁束発生手段は定着ローラの外側に配置して発生磁束を定着ローラの外表面から電磁誘導発熱性層に作用させることによって、発熱に寄与し、渦電流を発生させる電磁誘導発熱性層の熱容量が小さく、この電磁誘導発熱性層がスポンジ層により断熱保持されるため、定着ローラ表面側にある弾性層あるいは離型層を迅速に加熱するように作用し、定着ローラ表面が定着に必要な温度に迅速に到達するとともに、紙等のメディアに熱が奪われても、熱の供給が追いつくことができる。

【0016】b) また、スポンジ層により断熱保持させた電磁誘導発熱性層自体のたわみ性を利用して定着ローラと加圧ローラとの圧接ニップ部の形成に対して、弾性

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層が300 μ mと薄くしても、今まで以上の幅のニップが形成でき、また定着ローラの硬度が加圧ローラの硬度に比べて小さくなる構成なので圧接ニップ部を出た記録材部分の排紙方向が定着ローラから離れ方向となって、マイクログロスの発生がなく、OHTのような定着ローラに巻き付きやすいメディアに対しても、十分な分離性能を確保できる。

【0017】c) 上記のようにスポンジ層を具備させた定着ローラは、スポンジ層があることにより、スポンジ層のない定着ローラとの対比において、偏心し易かったり、ステックスリップ状送りや上下流の記録材の負荷変動に弱い等が予想され、定着ローラの周速が定着ローラの外径変化が大きいために安定しないことで定着ローラと加圧ローラがスリップし易い。定着ローラと加圧ローラがスリップすると、画像形成手段とモータが共通であると画像形成手段側にスリップショックが伝わり、画像形成を阻害する。また圧接ニップ部を記録材が通過中にスリップするとスリップ跡が画像に残ってしまう。

【0018】本発明においては、定着ローラと加圧ローラがスリップしない手段を備えたことで、定着ローラの周速が外径変化のために安定しなくとも定着ローラと加圧ローラがスリップすることを防止して、スリップに起因する上記の問題をなくしている。

【0019】

【発明の実施の形態】〈第一の実施例〉(図1～図3)
図1は本実施例における定着装置の要部の横断面模型図、図2は定着ローラと加圧ローラとを結ばせたギアレイン側の装置側面の要部図、図3は図2の(3)ー

(3)線に沿う展開図である。本実施例における定着装置は特にフルカラーおよび白黒高速用定着装置として好適である。

【0020】1は定着ローラ、2は加圧ローラ、3は磁束発生手段、4は高周波コンバーター(励磁回路)、5は温度センサー、6は制御回路、7は記録材搬送ガイド、8は分離爪、Pは記録材、tはこの記録材上の未定着トナー像である。

【0021】定着ローラ1と加圧ローラ2は上下に並行に配列してそれぞれ奥側と手前側の軸端部を奥側と手前側の装置シャシ側板41a・41b間(図3)に軸受部材42を介して回転自在に支持させてあり、加圧ローラ2を加圧パネ46や加圧板47(図2)を含む加圧機構によって定着ローラ1の回転軸方向に付勢して定着ローラ1の下面部に所定の加圧力で圧接させて圧接ニップ部(定着ニップ部)Nを形成させている。

【0022】a) 定着ローラ1

定着ローラ1は、内側から外側に順に、支持層としての芯金シリンダ11、スポンジ層12、電磁誘導発熱性層としての導電層13、弾性層14、離型層15の5層構成である。ローラ硬度は例えば30°～70°(ASK ER-C 1kg)のものをを使う。

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【0023】本例において、支持層としての芯金シリンダ11は、外径40mm、厚さ0.7mmの鉄製シリンダである。

【0024】スポンジ層12は、電磁誘導発熱性層13を断熱保持するとともに、電磁誘導発熱性層13のたわみを許容して圧接ニップ部Nの幅を増やし、また加圧ローラよりもローラ硬度を小さくして排紙性・記録材分離性能を向上させる役目をするもので、耐熱性・弾性を有するゴム材や樹脂材のスポンジ体（断熱構造体）が用いられ、例えば、厚さ2～10mmに設定される。本例においてこのスポンジ層12は、アスカーゴム硬度計で30度、厚さ10mmのシリコンゴムのスポンジ層である。必要に応じてプライマーで接着する。

【0025】電磁誘導発熱性層としての導電層13は本例においては、厚さ100μmの無端状のニッケル電鍍ベルト層である。電磁誘導発熱性層13は他の材料として、例えば磁性ステンレスのような磁性材料（磁性金属）といった、比較的透磁率μが高く、適当な抵抗率ρを持つ物を用いてもよい。さらに非磁性材料でも、金属などの導電性のある材料は材料を薄膜にする事などにより使用可能である。

【0026】弾性層14は記録材と定着ローラ表面との密着性を高める50～1000μmに設定される。本例においては、JIS-Aのゴム硬度計（JIS K6301のA型硬度計により規定される硬度）で1度、厚さ300μmのシリコンゴムの層である。

【0027】最外層の離型層15は定着ローラ表面の離型性を高めるためのもので、例えばPTFEやPFA等のフッ素系樹脂の厚さ10～50μmの層である。

【0028】b) 加圧ローラ2

加圧ローラ2は、外径40mmの鉄製の芯金21の外周に、厚さ10mmのSiゴムの層22と、さらに定着ローラ1と同様に表面の離型性を高めるために例えばPTFEやPFA等のフッ素系樹脂の厚さ10～50μmの離型層23を設けた、全体外径60mmのローラである。

【0029】加圧ローラ2は定着ローラ1に対して約50Kg重で加圧されており、その場合圧接ニップ部Nのニップ幅は約7.5mmになる。都合によっては荷重を変化させてニップ幅を変えてもよい。

【0030】c) 磁束発生手段3

磁束発生手段3は励磁コイル31と磁性体コア32とからなり、定着ローラ1の外側において定着ローラに対向させて定着ローラの長手方向に沿わせて配設してある。

【0031】磁性体コア32は、横断面E型で、定着ローラ1の長手方向寸法に略対応した長さ寸法を有する長尺部材である。励磁コイル31はこの横断面E型で長尺の磁性体コア32の中央突起部に長手方向に渡って導線を巻いたような構造である。

【0032】また励磁コイル31は高周波コンバーター

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4に接続されて100～2000[W]の高周波電力が供給されるため、細い線を数本リッツにしたものを用いており、巻き線に伝熱した場合を考え、被覆には耐熱性の物を使用した。

【0033】磁性体コア32は高透磁率かつ低損失のものを用いる。パーマロイのような合金の場合は、コア内の渦電流損失が高周波で大きくなるため積層構造にしてもよい。コア32は磁気回路の効率を上げるためと磁気遮蔽のために用いている。このコイル31とコア32の磁気回路部分は、磁気遮蔽が十分にできる手段がある場合は空芯（コア無し）にしてもよい。

【0034】d) 駆動系

図2・図3においてG1～G8は定着装置駆動系の第1から第8のギアからなるギアトレインである。

【0035】第1ギアG1は駆動ギアであり、奥側と手前側の装置シャシ側板41a・41bの奥側の側板41aに回転自由に枢着させてある。この第1ギアG1に不図示の駆動源側ギアが噛合して第1ギアG1が所定の方向に所定の速度で回転駆動される。

【0036】第2ギアG2は第1ギアG1と噛合するアイドラギアであり、第1ギアG1と同じく奥側の側板41aに回転自由に枢着させてある。

【0037】第3ギアG3は定着ローラ1の奥側の軸端部に固着させてあり、第2ギアG2と噛合する。

【0038】第4ギアG4は定着ローラ1の手前側の軸端部に固着させたギアであり、定着ローラ1と一体に回転する。

【0039】第5ギアG5は上記第4ギアG4と噛合するアイドラギアであり、手前側の側板41bと補助側板43との間に設けた軸に回転自由に保持させてある。

【0040】第6ギアG6と第7ギアG7は手前側の側板41bと補助側板43との間に回転自由に軸受保持させた回転軸45に同軸に設けたアイドラギアである。そして第6ギアG6は回転軸45にワンウェイギア44

（本例は32歯ギア）を介して支持させてあり、第5ギアG5と噛合する。第7ギアG7は回転軸45に固着して支持させてあり回転軸45と一体に回転する。

【0041】第8ギアG8は加圧ローラ2の手前側の軸端部に固着させてあり、第7ギアG7と噛合する。

【0042】そして、第1ギアG1の回転駆動力が第2ギアG2・第3ギアG3を介して定着ローラ1に伝達されて、該定着ローラ1が所定の方向に所定の速度で回転駆動される。

【0043】加圧ローラ2は通常は圧接ニップ部Nでの定着ローラ1との圧接摩擦力で定着ローラ1の回転に従動して回転する。

【0044】一方、定着ローラ1の回転力は第4ギアG4→第5ギアG5→第6ギアG6→ワンウェイギア44→軸45→第7ギアG7→第8ギアG8を介して加圧ローラ2に伝達される。ただしこの場合、第8ギアG8

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は、圧接ニップ部Nでの定着ローラ1との圧接摩擦力で定着ローラ1の回転に従動して回転する加圧ローラ2の回転数よりも若干小さい回転数で駆動されている。

【0045】ワンウェイギア44は図2において時計方向にロックするものとする事により、加圧ローラ2が圧接ニップ部Nでの定着ローラ1との圧接摩擦力で定着ローラ1の回転に従動して通常速度で回されている状態時にはロックされず、スリップや定着ローラ1の偏心により加圧ローラの速度が下がった時にワンウェイギア44はロックして定着ローラ1の回転力が上記のギアトレインG4～G8の経路で加圧ローラ2に伝達されて、圧接ニップ部Nでの定着ローラ1との圧接摩擦力で定着ローラ1の回転に従動して回転する加圧ローラ2の回転数よりも若干小さい回転数で回転駆動されることになり、加圧ローラ2の圧接ニップ部Nでの周速を安定させることができる。

【0046】即ち、本実施例においては、上記のワンウェイギア44を含むギアトレインG4～G8が定着ローラ1と加圧ローラ2を実質的にスリップさせない手段である。

【0047】e) 定着ローラ1の加熱と温調制御
励磁コイル31には高周波コンバーター4により10～100[kHz]の交流電流が印加される。交流電流によって誘導された磁束はE型磁性体コア32の内部を外部に漏れることなく通り、コアの突起部間で初めて磁性体コア外部に漏れ、定着ローラ1の電磁誘導発熱性層である導電層13を貫き、導電層13に渦電流が流れて導電層自体がジュール発熱する。この導電層13の発熱で定着ローラ1が加熱状態となる。

【0048】温度センサー5は例えばサーミスタであり、定着ローラ1の表面に当接するように配置され、この温度センサー5の定着ローラ表面温度検出信号が制御回路6に入力する。制御回路6は温度センサー5から入力する定着ローラ表面温度検出信号をもとに高周波コンバーター4を制御して高周波コンバーター4から励磁コイル31への電力供給を増減させることで、定着ローラ1の表面温度が所定の一定温度になる様自動制御される。

【0049】f) 定着動作

定着ローラ1が回転駆動され、これに伴い加圧ローラ2も従動回転し、磁束発生手段3の発生磁束の作用により定着ローラ1の電磁誘導発熱性層としての導電層13が電磁誘導発熱して定着ローラ1の表面温度が所定の一定温度になる様自動制御された状態において、定着ローラ1と加圧ローラ2との圧接ニップ部Nに、不図示の作像機構部から搬送された未定着トナー像tを形成担持した記録材Pが搬送ガイド7で案内されて導入される。この場合、記録材Pの未定着トナー像形成担持面側が定着ローラ1に対面する。

【0050】定着ローラ1と加圧ローラ2との圧接ニッ

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部Nに導入された記録材Pは圧接ニップ部Nを挟持搬送され、定着ローラ1で加熱されて、未定着トナー像tが記録材Pに熔融定着される。

【0051】圧接ニップ部Nを通った記録材Pは定着ローラ1から分離して排出搬送されていく。分離爪8は定着ローラ1の表面に当接させて配置され、記録材Pが圧接ニップ部通過後に定着ローラ1面に張り付いてしまった場合に定着ローラ1面から強制的に分離させてしてジャムを防止するためのものである。

【0052】而して、定着ローラ1は前記したようにその層構成を内側から外側に順に、支持層11、スポンジ層12、電磁誘導発熱性層13、弾性層14、離型層15の少なくとも5層から構成し、磁束発生手段3は定着ローラ1の外側に配置して発生磁束を定着ローラ1の外側から電磁誘導発熱性層13に作用させることによって、発熱に寄与し、渦電流を発生させる電磁誘導発熱性層13の熱容量が小さく、この電磁誘導発熱性層13がスポンジ層12により断熱保持されるため、定着ローラ表面側にある弾性層14あるいは離型層15を迅速に加熱するように作用し、定着ローラ表面が定着に必要な温度に迅速に到達するとともに、紙等のメディアPに熱が奪われても、熱の供給が追いつくことができた。

【0053】また、スポンジ層12により断熱保持させた電磁誘導発熱性層13自体のたわみ性を利用して定着ローラ1と加圧ローラ2との圧接ニップ部Nの形成に対して、定着ローラ1の弾性層14を300μmと薄くしても、今まで以上の幅のニップが形成でき、マイクログロスの発生がなく、OHTのような定着ローラに巻き付きやすいメディアに対しても、十分な分離性能を確保できる。

【0054】さらに、常時は圧接ニップ部Nでの定着ローラ1との圧接摩擦力で定着ローラ1の回転に従動して通常速度で回されている加圧ローラがスリップや定着ローラ1の偏心によりすべった場合でもワンウェイギア44を含むギアトレインG4～G8を介して定着ローラ1の回転力が加圧ローラ2に伝達されて加圧ローラ2の回転駆動がなされることで加圧ローラ2を実質的にスリップさせず、加圧ローラ2の圧接ニップ部Nでの周速を安定させることができる。

【0055】従って、定着ローラ1の周速が外径変化のために安定しなくとも定着ローラ1と加圧ローラ2がスリップすることを防止して、スリップに起因する、画像形成に対する悪影響、画像に対するスリップ跡の発生等をなくすることができる。

【0056】定着ローラ1と加圧ローラ2がスリップしない手段としては上記例のワンウェイギア44を含むギアトレインG4～G8以外にも種々案出できる。例えば、定着ローラ1と加圧ローラをそれぞれ独立駆動系とし、加圧ローラ2の回転数をモニタしてある回転数以下で駆動を連結する方法もある。

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【0057】〈第二の実施例〉本実施例は、上述した第一の実施例において、32歯のワンウェイギア44を33歯のワンウェイギアにして、加圧ローラ2の速度が定着ローラ1よりも33/32だけ早く回転するようにした。その他は第一の実施例と同様の装置構成とした。これは、両面画像形成時に、一面目の画像面積が大きいと、加圧ローラ2とメディアP間で滑る場合があり、それを防止するためである。

【0058】その他は第一の実施例と同様の装置構成であり、同様の効果が得られる。

【0059】〈第三の実施例〉本実施例は、第一又は第二の実施例において、定着ローラ1の芯がね11を厚さ0.7mmの鉄製シリンダに代えて、厚さ3mmのアルミ製シリンダにした。

【0060】定着ローラ1の芯がね11としての厚さ3mmのアルミ製シリンダは厚さ0.7mmの鉄製シリンダよりも熱容量が大きいけれども、定着ローラ1の芯がね11はスポンジ層12で断熱されているため、熱容量が大きくなっても影響はない。

【0061】定着ローラ1の芯がね11の材質は強度が確保できれば、例えばPPSのような耐熱性のモールドのパイプを使用することも可能である。

【0062】その他は第一又は第二の実施例と同様の装置構成であり、同様の効果が得られる。

【0063】〈第四の実施例〉本実施例は、第一又は第二又は第三の実施例において、定着ローラ1の電磁誘導発熱性層13として、SUS製の厚さ0.2mmの電縫管（シート状のSUSを丸めて管状にしてつぎ目を溶接したもの）を使用した。

【0064】その他は第一又は第二又は第三の実施例と同様の装置構成であり、同様の効果が得られる。

【0065】〈第五の実施例〉（図4）
本実施例は画像形成装置例であり、図4はその概略構成図である。本例の画像形成装置は電子写真4色カラープリンタである。

【0066】51は有機感光体でできた電子写真感光体ドラム（像担持体）であり、矢示の反時計方向に所定のプロセススピード（周速度）で回転駆動される。

【0067】感光体ドラム51はその回転過程で帯電ローラ等の帯電装置52で所定の極性・電位の一様な帯電処理を受ける。

【0068】次いでその帯電処理面にレーザ光学箱（レーザスキャナ）53から出力されるレーザ光Lによる、目的の画像情報の走査露光処理を受ける。レーザ光学箱53は不図示の画像読取装置等の画像信号発生装置からの目的画像情報の時系列電気デジタル画素信号に対応して変調（オン／オフ）したレーザ光Lを出力して回転感光体面を走査露光するもので、この走査露光により回転感光体ドラム51面に走査露光した目的画像情報に対応した静電潜像が形成される。53aはレーザ光学箱53

からの出力レーザ光を感光体ドラム51の露光位置に偏向させるミラーである。

【0069】フルカラー画像形成の場合は、目的のフルカラー画像の第1の色分解成分画像、例えばイエロー成分画像についての走査露光・潜像形成がなされ、その潜像が4色カラー現像装置54のうちのイエロー現像器54Yの作動でイエロートナー像として現像される。そのイエロートナー像は感光体ドラム51と中間転写体ドラム56との接触部（或は近接部）である一次転写部T1において中間転写体ドラム56の面に転写される。中間転写体ドラム56面に対するトナー像転写後の回転感光体ドラム51面はクリーナ57により転写残りトナー等の付着残留物の除去を受けて清掃される。

【0070】上記のような帯電・走査露光・現像・一次転写・清掃のプロセスサイクルが、目的のフルカラー画像の、第2（例えばマゼンタ成分画像、マゼンタ現像器54Mが作動）、第3（例えばシアン成分画像、シアン現像器54Cが作動）、第4（例えば黒成分画像、黒現像器54BKが作動）の各色分解成分画像について順次に実行され、中間転写体ドラム56面にイエロートナー像・マゼンタトナー像・シアントナー像・黒トナー像の都合4色のトナー像が順次重ねて転写されて、目的のフルカラー画像に対応したカラー画像が合成形成される。

【0071】中間転写体ドラム56は、金属ドラム上に中抵抗の弾性層と高抵抗の表層を有するもので、感光体ドラム51に接触して或は近接して感光体ドラム51と略同じ周速度で矢示の時計方向に回転駆動され、金属ドラムにバイアス電位を与えて感光体ドラム51との電位差で感光体ドラム51側のトナー像を該中間転写体ドラム面側に転写させる。

【0072】上記の回転中間転写体ドラム56面に合成形成されたカラートナー画像は、該回転中間転写体ドラム56と転写ローラ55との接触ニップ部である二次転写部T2において、該二次転写部T2に不図示の給紙部から所定のタイミングで送り込まれた記録材（転写材）Pの面に転写されていく。転写ローラ55は記録材Pの背面からトナーと逆極性の電荷を供給することで中間転写体ドラム56面側から記録材P側へ合成カラートナー画像を順次に一括転写する。

【0073】二次転写部T2を通過した記録材Pは中間転写体ドラム56の面から分離されて定着装置Aへ導入され、未定着トナー像の加熱定着処理を受けてカラー画像形成物として機外の不図示の排紙トレイに排出される。

【0074】定着装置Aは本発明に従う電磁誘導加熱方式の定着装置であり、例えば第一又は第二又は第三の実施例の定着装置である。

【0075】記録材Pに対するカラートナー像転写後の回転中間転写体ドラム56はクリーナ58により転写残りトナー・紙粉等の付着残留物の除去を受けて清掃され

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る。このクリーナ58は常時は中間転写体ドラム56に非接触状態に保持されており、中間転写体ドラム56から記録材Pに対するカラートナー画像の二次転写実行過程において中間転写体ドラム56に接触状態に保持される。

【0076】また転写ローラ55も常時は中間転写体ドラム56に非接触状態に保持されており、中間転写体ドラム56から記録材Pに対するカラートナー画像の二次転写実行過程において中間転写体ドラム56に記録材Pを介して接触状態に保持される。

【0077】なお、本発明の定着装置には、画像を担持した記録材を加熱して艶等の表面性を改質したり、仮定着する等の像加熱装置も含まれる。

【0078】

【発明の効果】以上説明したように本発明によれば、電磁誘導加熱方式の定着装置について、ハロゲンヒータを用いた熱ローラ方式の定着装置と同等あるいはそれ以上の効率を得られ、迅速に立ち上がる、マイクログロスの発生がなく、OHTのような定着ローラに巻き付きやすいメディアに対しても、十分な分離性能を確保できる等の長を具備させることができる。また、定着ローラと加圧ローラがスリップしない手段を備えたことで、定着ローラの周速が外径変化のために安定しなくとも定着ローラと加圧ローラがスリップすることを防止して、スリップに起因する画像形成に対する悪影響、画像に対するスリップ跡の発生等をなくすることができる。

【図面の簡単な説明】

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【図1】 第一の実施例における定着装置の要部の横断面模型図

【図2】 定着ローラと加圧ローラとを結ばせたギアトレイン側の装置側面の要部図

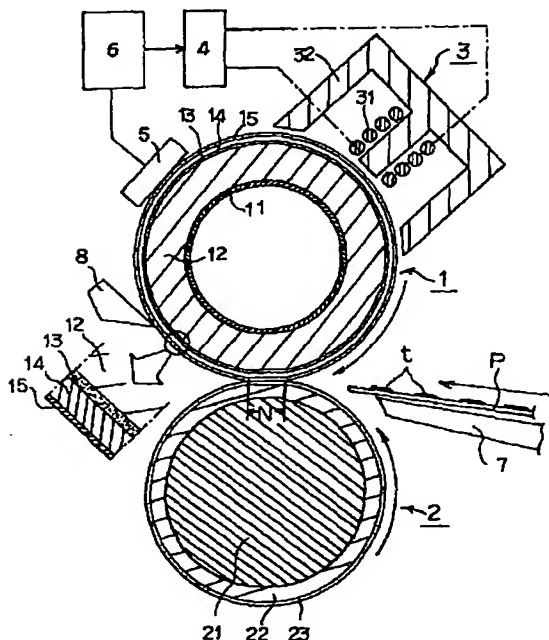
【図3】 図2の(3)-(3)線に沿う展開図

【図4】 第五の実施例における画像形成装置例の概略構成図

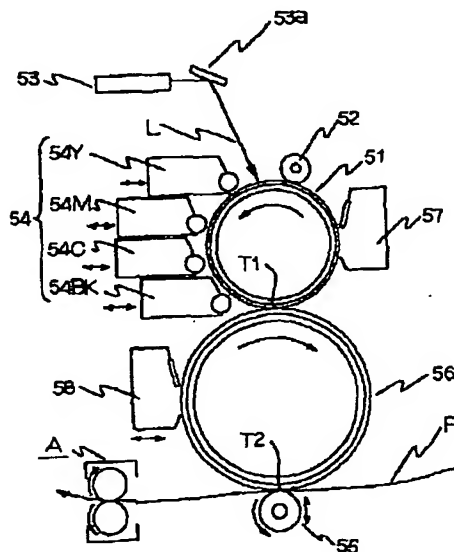
【符号の説明】

- 1・・・定着ローラ
- 11・・・支持層としての芯金シリンダ（支持層）
- 12・・・スポンジ層
- 13・・・電磁誘導発熱性層
- 14・・・弾性層
- 15・・・離型層
- 2・・・加圧ローラ
- 3・・・磁束発生手段
- 31・・・励磁コイル
- 32・・・磁性体コア
- 4・・・高周波コンバーター（励磁回路）
- 5・・・温度センサー
- 6・・・制御回路
- 7・・・記録材搬送ガイド
- 8・・・分離爪
- P・・・記録材
- t・・・未定着トナー像
- G1～G8・・・ギアトレイン
- 44・・・ワンウェイギア

【図1】



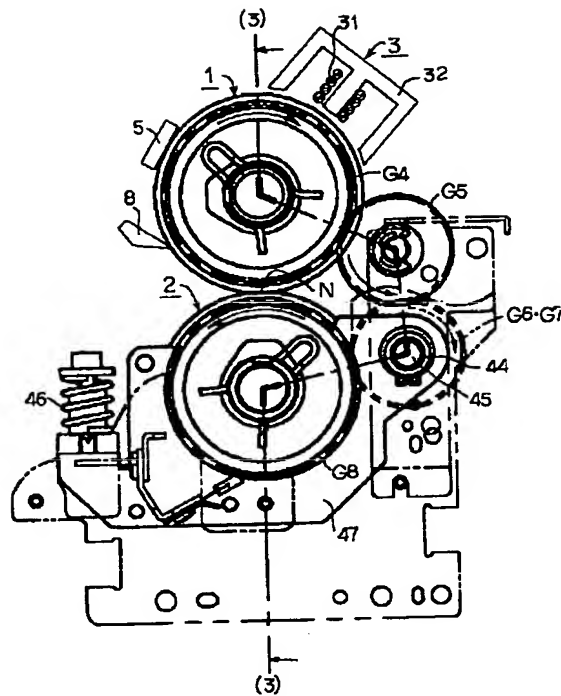
【図4】



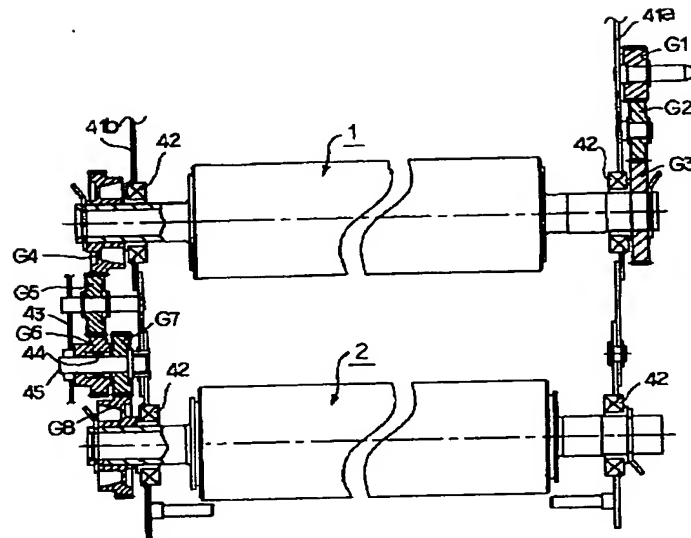
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【図2】



【図3】



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AD34 CD44 CD52 CD73 CD75
CD77

FIXING DEVICE AND IMAGE FORMING DEVICE

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EC Classification:
Equivalents:

Abstract

PROBLEM TO BE SOLVED: To make a fixing device of an electromagnetic-induction heating system obtainable an efficiency equal to or higher than that obtained by a fixing device of a heat roller system using a halogen heater, to accomplish a speedy start-up, to prevent the occurrence of a micro-gloss, and to ensure sufficient separation performance even for a medium such as OHT, which is easy to wrap-round a fixing roller easily.

SOLUTION: The fixing device of a magnetic-induction heating system has a fixing roller 1 and a pressure roller 2 being in pressure-contact with each other, heats the fixing roller with a magnetic flux generated by a magnetic-flux generation means 3, and, through the pressure-contact nip N of both the rollers 1 and 2, sandwiches and carries a recording material P with a fixed image (t) held thereon, thereby melting and fixing the unfixed image (t) onto the recording material P. The fixing roller 1 comprises at least five layers, which are, from inside toward outside in order, a support layer 11, a sponge layer 12, an electromagnetic-induction heat generation layer 13, an elastic layer 14, and a releasing layer 15. The magnetic-flux generation means 3 is disposed outside the fixing roller 1, and the fixing roller 1 and the pressure roller have a non-slip means (a gear train, a one-way gear).

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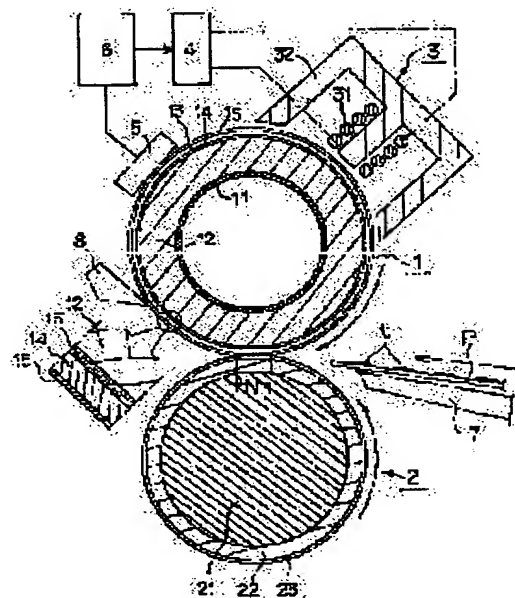
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54) FIXING DEVICE AND IMAGE FORMING DEVICE

57)Abstract:

PROBLEM TO BE SOLVED: To make a fixing device of an electromagnetic-induction heating system obtainable an efficiency equal to or higher than that obtained by a fixing device of a heat roller system using a halogen heater, to accomplish a speedy start-up, to prevent the occurrence of a micro-gloss, and to ensure sufficient separation performance even for a medium such as OHT, which is easy to wrap-around a fixing roller easily.

SOLUTION: The fixing device of a magnetic-induction heating system has a fixing roller 1 and a pressure roller 2 being in pressure-contact with each other, heats the fixing roller with a magnetic flux generated by a magnetic-flux generation means 3, and, through the pressure-contact nip of both the rollers 1 and 2, sandwiches and carries a recording material P with a fixed image (t) held thereon, thereby melting and fixing the fixed image (t) onto the recording material P. The fixing roller 1 comprises at least five layers, which are, from inside toward outside in order, a support layer 11, a sponge layer 12, an electromagnetic-induction heat generation layer 13, an elastic layer 14, and a releasing layer 15. The magnetic-flux generation means 3 is disposed outside the fixing roller 1, and the fixing roller 1 and the pressure roller have a non-slip means (a gear train, a one-way gear).



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LAIMS

Claim(s)]

Claim 1] It has the fixing roller and pressurization roller which the pressure welding is carried out and can rotate freely on a front face mutually. The electromagnetic-induction febrility layer prepared in the fixing roller by the generating magnetic flux of a magnetic-flux generating means is made to generate heat. It is fixing equipment of the electromagnetic-induction heating method which pinching conveyance of the record material which supported the non-established image with the pressure-welding nip section of a fixing roller and a pressurization roller is carried out method], and makes record material carry out melting fixing of the non-established image. A fixing roller is fixing equipment characterized by having a means by which consist of at least five layers, supporters, a sponge layer, an electromagnetic-induction febrility layer, an elastic layer, and a mold release layer, in order outside from the inside, and a fixing roller and a pressurization roller do not slip.

Claim 2] Fixing equipment according to claim 1 characterized by a means by which a fixing roller and a pressurization roller do not slip being the one-way gear which prevents the inverse rotation which made the turning effort of a fixing roller placed between the transfer system transmitted to a pressurization roller, and its transfer system.

Claim 3] A magnetic-flux generating means is fixing equipment according to claim 1 or 2 characterized by making a fixing roller counter, making the longitudinal direction of a fixing roller meet, and having arranged.

Claim 4] A magnetic-flux generating means is fixing equipment given in the claim 1 or any of 3 they are. [which is characterized by being an exiting coil and a magnetic-substance core]

Claim 5] It is fixing equipment according to claim 4 which a magnetic-substance core is made to counter a fixing roller, is made to meet the longitudinal direction of a fixing roller, arranges, and is characterized by having carried out the winding of the exiting coil over the longitudinal direction of a fixing roller.

Claim 6] It is image formation equipment characterized by a fixing means being fixing equipment given in any [a claim 1 or] of 5 they are in the image formation equipment which has an imaging means to form a non-established image in record material, and a fixing means to make record material carry out melting fixing of the non-established image made [record material] to carry out formation support.

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DETAILED DESCRIPTION

Detailed Description of the Invention]

0001]

The technical field to which invention belongs] this invention relates to the image formation equipment possessing the fixing equipment (fixing assembly) of the electromagnetic-induction heating method which carries out melting fixing (heating fixing) of the non-established image on record material (media), and this fixing equipment.

0002]

Description of the Prior Art] Conventionally, in image formation equipments, such as a copying machine and a printer, the equipment of a heat mechanical control by roller is used widely as fixing equipment which carries out melting fixing of the non-established image (image of the **** agent (toner) of heating melting nature which consists of a resin, the magnetic substance, a colorant, etc.) which carried out formation support on record material by the print method or the direct method by proper imaging process meanses, such as an electrophotography process and an electrostatic recording process, at record material. The fixing equipment of a heat mechanical control by roller is what carries out melting fixing of the non-established toner image by applying heat and a pressure, carrying out **** conveyance of the record material which made the non-established toner image of each other support with the pressure-welding nip section (fixing nip section) of a pressure welding, a revolving fixing roller (heat roller), and a ressurization roller. What is made to build a halogen lamp in a fixing roller as a heat source, heats a fixing roller from the interior with this halogen lamp as a means to heat the fixing roller which is a heat roller, and carries out the ** tone of the temperature of a fixing roller front face to the suitable temperature for fixing was common.

0003] As other meanses to heat the fixing roller which is a heat roller, make the conductive layer prepared in the fixing roller inside by the magnetic flux by the exiting coil generate an eddy current, a conductive layer is made to generate heat by the Joule's heat, and the fixing equipment of the electromagnetic-induction heating method which heated the fixing roller by the generation of heat is proposed.

0004] The fixing equipment of this electromagnetic-induction heating method has the feature that the time taken for the temperature of a fixing roller front face to turn into suitable temperature for fixing at fixing equipment during starting as compared with the fixing equipment of a toner image using the halogen lamp since it put on near very much an shorten the source of heat release. Moreover, since the heat transfer path from the source of heat release to a toner image is short and simple, there is the feature that thermal efficiency is high.

0005] The fixing roller for color copying machines, and the fixing roller for high-speed monochrome copying machines Carry out and the product with a thickness of 3mm or more made from an aluminum cylinder (aluminum cylinder) is used. the heart -- ** -- This heart prepares an elastic layer 500 micrometers or more in the upper layer, the heart prepares an exiting coil in the interior, and this heart carries out electromagnetic-induction generation of heat of the ** by the generating magnetic flux of this exiting coil. While the heart uses own big heat capacity and eases the temperature fall of the fixing roller at the time of continuation ****, it has prevention of the minute uneven brightness in a picture (micro gross), and the black effect of making admiration taking out gently, according to the effect of the elastic layer which exists in the upper layer.

0006]

Problem(s) to be Solved by the Invention] However, it sets to the fixing equipment of the electromagnetic-induction heating method which prepared the exiting coil in the interior of a fixing roller like the above-mentioned conventional example. In order for the aluminum heart to come out and to generate heat efficiently, even if it centralizes magnetic flux on a narrow field and passes the induced current with big density Efficient generation of heat is not acquired (as for aluminum, surface electrical resistance Rs cannot generate heat [permeability mu] easily small due to a low's). Moreover, when the composition which arranges the exiting coil and magnetic-substance core as a magnetic-flux generating means in the fixing roller exterior is chosen By existence of the elastic layer of a fixing roller, the gap

between coil cores became large, the distance of until became [the heart] far, namely, distance of a between was not able to become far and a coil core and the fixing roller heart were not able to acquire about the same exoergic efficiency as a halogen heater.

0007] Then, the efficiency beyond it is acquired, there is no generating of the micro gross which starts quickly, and the purpose of this invention is to offer [equivalent to the fixing equipment of the heat mechanical control by roller which used the halogen heater, or] the fixing equipment of the electromagnetic-induction heating method which made the feature that sufficient separability ability is securable etc. provide also to the media which are easy to coil around a fixing roller like OHT.

0008]

Means for Solving the Problem] this invention is the fixing equipment and image formation equipment which are characterized by the following composition.

0009] (1) It has the fixing roller and pressurization roller which the pressure welding is carried out and can rotate freely on a front face mutually. The electromagnetic-induction febrility layer prepared in the fixing roller by the generating magnetic flux of a magnetic-flux generating means is made to generate heat. It is fixing equipment of the electromagnetic-induction heating method which pinching conveyance of the record material which supported the non-established image with the pressure-welding nip section of a fixing roller and a pressurization roller is carried out method], and makes record material carry out melting fixing of the non-established image. A fixing roller is fixing equipment characterized by having a means by which consist of at least five layers, supporters, a sponge layer, an electromagnetic-induction febrility layer, an elastic layer, and a mold release layer, in order outside from the inside, and a fixing roller and a pressurization roller do not slip.

0010] (2) Fixing equipment given in (1) characterized by a means by which a fixing roller and a pressurization roller do not slip being the one-way gear which prevents the inverse rotation which made the turning effort of a fixing roller placed between the transfer system transmitted to a pressurization roller, and its transfer system.

0011] (3) A magnetic-flux generating means is fixing equipment given in (1) characterized by making a fixing roller counter, making the longitudinal direction of a fixing roller meet, and having arranged, or (2).

0012] (4) A magnetic-flux generating means is fixing equipment given in any of (1) or (3) which are characterized by using an exiting coil and a magnetic-substance core they are.

0013] (5) It is fixing equipment given in (4) which a magnetic-substance core is made to counter a fixing roller, is made to meet the longitudinal direction of a fixing roller, arranges, and is characterized by having carried out the winding of the exiting coil over the longitudinal direction of a fixing roller.

0014] (6) It is image formation equipment characterized by a fixing means being fixing equipment given in any of (1) or (5) they are in the image formation equipment which has an imaging means to form a non-established image in record material, and a fixing means to make record material carry out melting fixing of the non-established image made [record material] to carry out formation support.

0015] <*** **> In order, outside the lamination of a fixing roller from the inside Supporters, By constituting from at least five layers of a sponge layer (foam layer), an electromagnetic-induction febrility layer, an elastic layer, and a mold release layer, arranging a magnetic-flux generating means on the outside of a fixing roller, and making generating magnetic flux act on an electromagnetic-induction febrility layer from the superficies side of a fixing roller Since the heat capacity of the electromagnetic-induction febrility layer which it contributes [layer] to generation of heat and generates an eddy current is small and heat insulation maintenance of this electromagnetic-induction febrility layer is carried out by the sponge layer, While it acts so that the elastic layer or mold release layer in a fixing roller surface side may be heated quickly, and a fixing roller front face reaches temperature required for fixing quickly, even if heat is taken by media, such as paper, supply of heat can catch up.

0016] b) Moreover, even if an elastic layer makes it thin with 300 micrometers to formation of the pressure-welding nip section of a fixing roller and a pressurization roller using the flexibility of the electromagnetic-induction febrility layer itself which carried out heat insulation maintenance by the sponge layer The delivery direction of the record material portion which came out of the pressure-welding nip section since it was the composition that could form the nip of the width of face more than former, and the degree of hardness of a fixing roller became small compared with the degree of hardness of a pressurization roller turns into the detached building direction from a fixing roller. There is no generating of a micro gross and sufficient separability ability can be secured also to the media which are easy to coil around a fixing roller like OHT.

0017] c) When the fixing roller which made the sponge layer provide as mentioned above has a sponge layer, carry out eccentricity in contrast with a fixing roller without a sponge layer, it is expected that it is weak to the load effect of the record material of *****, stick slip-like delivery, or a vertical style etc., and a fixing roller and a pressurization roller tend to slip by not being stabilized since outer-diameter change of a fixing roller has a large

ipheral speed of a fixing roller. If a fixing roller and a pressurization roller slip, a slip shock will get across that an image formation means and a motor are common to an image formation means side, and image formation will be blocked. Moreover, if it slips while record material passes the pressure-welding nip section, the remains of a slip will remain in a picture.

[18] In this invention, it is having had a means a fixing roller and a pressurization roller having not slipped, and it is prevented that a fixing roller and a pressurization roller slipped even if the peripheral speed of a fixing roller is not stabilized for outer-diameter change, and the above-mentioned problem resulting from a slip is lost.

[19]

embodiments of the Invention] <The first example> (drawing 1 - drawing 3)

the cross-section model view of the important section of fixing equipment [in / this example / in drawing 1], the important section view of the equipment side by the side of the gear train which drawing 2 made tie a fixing roller and pressurization roller, and drawing 3 are developments which meet the (3)-(3) line of drawing 2 . The fixing equipment in this example is suitable as especially full color and fixing equipment for monochrome high-speed.

[20] 1 -- a fixing roller and 2 -- a pressurization roller and 3 -- a magnetic-flux generating means and 4 -- for a control circuit and 7, a record material conveyance guide and 8 are [a RF converter (excitation circuit) and 5 / a pressure sensor and 6 / record material and t of a separation presser foot stitch tongue and P] the non-established toner images on this record material

[21] Arrange the fixing roller 1 and the pressurization roller 2 in parallel up and down, and the axis end section of a gear side is made to have supported [the back side] free [rotation] through the bearing material 42 between equipment chassis side plate 41a and 41b of a near side (drawing 3) the back side, respectively. The pressurization roller 2 is energized in the direction of the axis of rotation of the fixing roller 1 according to the pressurization mechanism containing the pressurization spring 46 or a pressure plate 47 (drawing 2), a pressure welding is carried out to the inferior-surface-of-tongue section of the fixing roller 1 with predetermined welding pressure, and the pressure-welding nip section (fixing nip section) N is made to form.

[22] a) The fixing roller 1 fixing roller 1 is 5 lamination of the conductive layer 13 as the rodding cylinder 11 as supporters, the sponge layer 12, and an electromagnetic-induction febrility layer, the elastic layer 14, and the mold release layer 15 in order from the inside to an outside. A roller degree of hardness uses a 30 degrees - 70 degrees (SKER-C 1kg) thing.

[23] In this example, the rodding cylinder 11 as supporters is an iron cylinder with an outer diameter [of 40mm], and a thickness of 0.7mm.

[24] While the sponge layer 12 carries out heat insulation maintenance of the electromagnetic-induction febrility layer 13 It is what carries out the duty which permits the deflection of the electromagnetic-induction febrility layer 13, and increases the width of face of the pressure-welding nip section N, and makes a roller degree of hardness smaller than a pressurization roller, and raises delivery nature and record material separability ability. The sponge object (thermal-protection-structure object) of the rubber material which has thermal resistance and elasticity, or resin material is used, for example, it is set to 2-10mm in thickness. The sponge layer 12 of this example smell lever is a sponge layer of silicone rubber with a thickness of 10mm 30 degrees in an ASUKAGOMU hardness meter. It pastes up / the primer if needed.

[25] The conductive layer 13 as an electromagnetic-induction febrility layer is a nickel electrocasting belt layer of the shape of endless [with a thickness of 100 micrometers] in this example. As other materials, permeability μ is comparatively high and the electromagnetic-induction febrility layer 13 may use an object [say / a magnetic material (magnetic metal) like for example, magnetic stainless steel] with the suitable resistivity ρ . The material in which a non-magnetic material furthermore also has metaled conductivity is usable by making material into a thin film etc.

[26] The elastic layer 14 is set as 50-1000 micrometers which raises the adhesion of record material and a fixing roller front face. In this example, it is the layer of silicone rubber with a thickness of 300 micrometers once in the rubber hardness meter (degree of hardness specified by A type hardness meter of JIS K6301) of JIS-A.

[27] The mold release layer 15 of an outermost layer of drum is for raising the mold-release characteristic of a fixing roller front face, for example, is a layer with a thickness [of fluorine system resins, such as PTFE and PFA,] of 10-50 micrometers.

[28] b) The pressurization roller 2 pressurization roller 2 is a roller with a whole outer diameter of 60mm which formed the mold release layer 23 with a thickness [of fluorine system resins, such as PTFE and PFA,] of 10-50 micrometers at it in order to raise a surface mold-release characteristic still like the fixing roller 1 with the layer 22 of silicone rubber with a thickness of 10mm to the periphery of the iron rodding 21 with an outer diameter of 40mm.

[29] The pressurization roller 2 is pressurized by about 50kg pile to the fixing roller 1, and the nip width of face of the pressure-welding nip section N is set to about 7.5mm in that case. A load may be changed depending on

venience and nip width of face may be changed.

030] c) The magnetic-flux generating means 3 magnetic-flux generating means 3 consists of an exciting coil 31 and a magnetic-substance core 32, make it counter a fixing roller on the outside of the fixing roller 1, it is made to meet the longitudinal direction of a fixing roller, and is arranged.

031] the long picture which the magnetic-substance core 32 is a cross-section E type, and has the linear dimension which carried out abbreviation correspondence in the longitudinal direction size of the fixing roller 1 -- it is a member exciting coil 31 is the structure which coiled lead wire around the central height of the long magnetic-substance core over the longitudinal direction with the this cross-section E type.

032] Moreover, since it connected with the RF converter 4 and the RF power of 100-2000 [W] was supplied, the exciting coil 31 uses what made the narrow line several Ritz, considered the case where heat transfer was carried out to bonding, and used the heat-resistant object for covering.

033] The magnetic-substance core 32 uses the thing of high permeability and low loss. In the case of an alloy like a permalloy, since an eddy current loss incore becomes large by the RF, you may make it into a laminated structure. The core 32 is used for magnetic shielding in order to gather the efficiency of a magnetic circuit. The part of the magnetic circuit of this coil 31 and a core 32 is good as for an air core (with no core), when there is a means whose magnetic shielding is fully possible.

034] d) In drive-system drawing 2 and drawing 3, G1-G8 are the gear trains which consist of a gear of the 1st to the octavus of a fixing equipment drive system.

035] The 1st gear G1 is a drive gear, and rotation freedom is made to have pivoted it in side plate 41a by the side of the back of equipment chassis side plate 41a and 41b of a near side the back side. A non-illustrated driving source side gear meshes on this 1st gear G1, and the rotation drive of the 1st gear G1 is carried out at the rate of predetermined in a predetermined direction.

036] The 2nd gear G2 is an idler gear which meshes with the 1st gear G1, and rotation freedom is made to have pivoted it in side plate 41a by the side of the back as well as the 1st gear G1.

037] 3rd gear G3 makes the axis end section by the side of the back of the fixing roller 1 have fixed, and gears with the 2nd gear G2.

038] The 4th gear G4 is a gear which the axis end section of the near side of the fixing roller 1 was made to fix, and rotated to the fixing roller 1 and one.

039] The 5th gear G5 is an idler gear which meshes with the 4th gear G4 of the above, and is made to have held at rotation freedom on the shaft established between side plate 41b of a near side, and the auxiliary side plate 43.

040] The 6th gear G6 and the 7th gear G7 are idler gears prepared in the axis of rotation 45 made [rotation freedom] carry out bearing maintenance between side plate 41b of a near side, and the auxiliary side plate 43 at the same axle. And the axis of rotation 45 is made to have supported the 6th gear G6 through the one-way gear 44 (for this example to be 32 gear-tooth gear), and it meshes with the 5th gear G5. The 7th gear G7 fixes to the axis of rotation 45, it is made to have supported it, and it is rotated to the axis of rotation 45 and one.

041] The axis end section of the near side of the pressurization roller 2 is made to have fixed, and the octavus gear G8 meshes with the 7th gear G7.

042] And the rotation driving force of the 1st gear G1 is transmitted to the fixing roller 1 through 2nd gear G2 and 3rd gear G3, and the rotation drive of this fixing roller 1 is carried out at the rate of predetermined in the predetermined direction.

043] The pressurization roller 2 is usually followed and rotated to rotation of the fixing roller 1 with pressure-welding frictional force with the fixing roller 1 in the pressure-welding nip section N.

044] on the other hand -- the turning effort of the fixing roller 1 -- 4th gear G4 -> 5th gear G5 -> 6th gear G6-> -- one-way -- it is transmitted to the pressurization roller 2 through the gear 44 -> shaft 45 -> 7th gear G7 -> octavus gear G8 However, the octavus gear G8 is driven in this case at the rotational frequency [a little] smaller than the rotational frequency of the pressurization roller 2 which follows and rotates to rotation of the fixing roller 1 with pressure-welding frictional force with the fixing roller 1 in the pressure-welding nip section N.

045] By locking the one-way gear 44 clockwise in drawing 2 It is not locked in the state where the pressurization roller 2 follows to rotation of the fixing roller 1 with pressure-welding frictional force with the fixing roller 1 in the pressure-welding nip section N, and is usually turned at speed. When the speed of a pressurization roller falls with the eccentricity of a slip or the fixing roller 1, lock the one-way gear 44 and the turning effort of the fixing roller 1 is transmitted to the pressurization roller 2 in the path of the above-mentioned gear trains G4-G8. A rotation drive will be carried out at a rotational frequency [a little] smaller than the rotational frequency of the pressurization roller 2 which follows and rotates to rotation of the fixing roller 1 with pressure-welding frictional force with the fixing roller 1 in the pressure-welding nip section N, and the peripheral speed in the pressure-welding nip section N of the pressurization

ler 2 can be stabilized.

046] That is, in this example, it is the means to which the gear trains G4-G8 containing the above-mentioned one-way gear 44 do not make the fixing roller 1 and the pressurization roller 2 slip substantially.

047] e) The alternating current of 10-100 [kHz] is impressed to heating of the fixing roller 1 and the ** tone control coil 31 by the RF converter 4. It passes along the interior of E type magnetic-substance core 32, without leaking outside, the magnetic flux guided by alternating current leaks to the magnetic-substance core exterior for the first time between the heights of a core, it pierces through the conductive layer 13 which is an electromagnetic-induction febrility layer of the fixing roller 1, an eddy current flows to a conductive layer 13, and the conductive layer itself carries out the generation of heat. The fixing roller 1 will be in a heating state by generation of heat of this conductive layer 13.

048] A thermo sensor 5 is a thermistor, it is arranged so that the front face of the fixing roller 1 may be contacted, and the fixing roller skin-temperature detecting signal of this thermo sensor 5 inputs it into a control circuit 6. A control circuit 6 is controlling the RF converter 4 based on the fixing roller skin-temperature detecting signal inputted from a thermo sensor 5, and making the electric power supply from the RF converter 4 to an exciting coil 31 fluctuate, so skin temperature of the fixing roller 1 turns into a predetermined constant temperature, and appearance automatic control of it is carried out.

049] f) A rotation drive is carried out and the fixing operation fixing roller 1 carries out follower rotation also of the pressurization roller 2 in connection with this. In the state where the conductive layer 13 as an electromagnetic-induction febrility layer of the fixing roller 1 carries out electromagnetic-induction generation of heat by operation of the generating magnetic flux of the magnetic-flux generating means 3, and the skin temperature of the fixing roller 1 turns into a predetermined constant temperature and where appearance automatic control was carried out The record material P which carried out formation support of the non-established toner image t conveyed from the non-illustrated imaging mechanism section is guided and introduced into the pressure-welding nip section N of the fixing roller 1 and the pressurization roller 2 in the conveyance guide 7. In this case, the non-established toner image formation support on the side of the record material P meets the fixing roller 1.

050] Pinching conveyance of the record material P introduced into the pressure-welding nip section N of the fixing roller 1 and the pressurization roller 2 is carried out in the pressure-welding nip section N, it is heated with the fixing roller 1 and melting fixing of the non-established toner image t is carried out at the record material P.

051] It dissociates from the fixing roller 1 and discharge conveyance of the record material P which passed along the pressure-welding nip section N is carried out. The separation presser foot stitch tongue 8 is for carrying out by making dissociate from the 1st page of a fixing roller compulsorily, and preventing a jam, when the front face of the fixing roller 1 is made to contact, it has been arranged and the record material P has stuck to the 1st page of a fixing roller after pressure-welding nip section passage.

052] As described above, ** and the fixing roller 1 outside the lamination from the inside in order It constitutes from at least five layers, supporters 11, the sponge layer 12, the electromagnetic-induction febrility layer 13, the elastic layer 14, and the mold release layer 15. By arranging the magnetic-flux generating means 3 on the outside of the fixing roller 1 and making generating magnetic flux act on the electromagnetic-induction febrility layer 13 from the external surface side of the fixing roller 1 Since the heat capacity of the electromagnetic-induction febrility layer 13 which it contributes [layer] to generation of heat and generates an eddy current is small and heat insulation maintenance of this electromagnetic-induction febrility layer 13 is carried out by the sponge layer 12, While it acted so that the elastic layer 14 or the mold release layer 15 in a fixing roller surface side might be heated quickly, and the fixing roller front face reached temperature required for fixing quickly, even if heat was taken by the media P, such as paper, supply of heat was able to catch up.

053] Moreover, even if it makes thin the elastic layer 14 of the fixing roller 1 with 300 micrometers to formation of the pressure-welding nip section N of the fixing roller 1 and the pressurization roller 2 using the flexibility of the electromagnetic-induction febrility layer 13 the very thing which carried out heat insulation maintenance by the sponge layer 12, the nip of the width of face more than former can be formed, there is no generating of a micro gross, and sufficient separability ability can be secured also to the media which are easy to coil around a fixing roller like OHT.

054] Furthermore The pressurization roller which always follows to rotation of the fixing roller 1 with pressure-welding frictional force with the fixing roller 1 in the pressure-welding nip section N, and is usually turned at speed with the eccentricity of a slip or the fixing roller 1 The pressurization roller 2 is not made to slip substantially by the driving effort of the fixing roller 1 being transmitted to the pressurization roller 2 through the gear trains G4-G8 which contain the one-way gear 44 even when it slides, and the rotation drive of the pressurization roller 2 being made. The peripheral speed in the pressure-welding nip section N of the pressurization roller 2 can be stabilized.

0055] Therefore, it can prevent that the fixing roller 1 and the pressurization roller 2 slip even if not stabilized for outer-diameter change of the peripheral speed of the fixing roller 1, and generating of the remains of a slip to the bad

fluence to image formation and a picture resulting from a slip etc. can be lost.

056] Many things can be thought out besides gear train [which contains the one-way gear 44 of the above-mentioned example as a means by which the fixing roller 1 and the pressurization roller 2 do not slip] G4 - G8. For example, there is also the method of connecting a drive below at the rotational frequency which makes the fixing roller 1 and a pressurization roller an independent drive system, respectively, and has carried out the monitor of the rotational frequency of the pressurization roller 2.

057] The <second example> this example uses the one-way gear 44 of 32 gear teeth as the one-way gear of 33 gear teeth, and it was made for the speed of the pressurization roller 2 to rotate it early only 33/32 rather than the fixing roller 1 in the first example mentioned above. Others were taken as the same equipment configuration as the first example. This is for sliding between the pressurization roller 2 and Media P, and preventing it at the time of double-ended image formation, if the picture area of a whole surface eye is large.

058] Others are the same equipment configurations as the first example, and the same effect is acquired.

059] The <third example> In the first or the second example, the heart of the fixing roller 1 replaced 11 with the iron cylinder with a thickness of 0.7mm, and used this example as the cylinder made from aluminum with a thickness of 3mm.

060] It is uninfluential even if heat capacity becomes large since, as for 11, the heart of the fixing roller 1 is insulated with the sponge layer 12 although the cylinder made from aluminum with a thickness [as 11] of 3mm has [the heart of the fixing roller 1] heat capacity larger than an iron cylinder with a thickness of 0.7mm.

061] The quality of the material of 11 has it, if the heart of the fixing roller 1 can secure intensity. [possible for using a pipe of a heat-resistant mould like PPS, for example]

062] Others are the same equipment configurations as the first or the second example, and the same effect is acquired.

063] The <fourth example> this example used the electric resistance welded pipe (what rounded off sheet-like SUS, made it tubular, and welded next eye) with a thickness [made from SUS] of 0.2mm as an electromagnetic-induction abrasibility layer 13 of the fixing roller 1 in the first or the second or third example.

064] Others are the same equipment configurations as the first or the second or third example, and the same effect is acquired.

065] <The fifth example> (drawing 4)

this example is an example of image formation equipment, and drawing 4 is the outline block diagram. The image formation equipment of this example is an electrophotography 4 color color printer.

066] 51 is the electrophotography photo conductor drum (image support) made with the organic photo conductor, and a rotation drive is carried out at a predetermined process speed (peripheral velocity) at the counterclockwise rotation of ****.

067] The photo conductor drum 51 receives uniform electrification processing of polarity and potential predetermined in the rotation process with the electrification equipments 52, such as an electrification roller.

068] Subsequently, scanning exposure processing of image information to be based on laser beam L outputted to the electrification processing side from the laser optical box (laser scanner) 53 is received. The electrostatic latent image corresponding to the purpose image information which the laser optical box 53 outputted laser beam L modulated corresponding to the time series electrical-and-electric-equipment digital pixel signal of the purpose image information from picture signal generators, such as a non-illustrated picture reader, (ON/OFF), carries out scanning exposure of the rotation photo conductor side, and carried out scanning exposure by this scanning exposure at the 51st page of a rotation photo conductor drum is formed. 53a is a mirror which makes the exposure position of the photo conductor drum 51 deflect the output laser beam from the laser optical box 53.

069] In the case of full color image formation, the scanning exposure and latent-image formation about the 1st target color-separation component picture, for example, yellow component picture, of a full color picture are made, and the latent image is developed as a yellow toner image by the operation of yellow development counter 54Y of the 4 color color developers 54. The yellow toner image is imprinted by the field of the middle imprint object drum 56 in the primary imprint section T1 which is the contact section (or proximity section) of the photo conductor drum 51 and the middle imprint object drum 56. The 51st page of the rotation photo conductor drum after the toner image imprint to the 6th page of a middle imprint object drum is cleaned by the cleaner 57 in response to removal of the adhesion residues, such as the imprint remaining toner.

0070] The above process cycles of electrification / scanning exposure, development, a primary imprint, and cleaning the 2nd of the target full color picture (for example, a Magenta component picture and Magenta development counter 54M operate), the 3rd (for example, a cyano component picture and cyano development counter 54C operate) and the 4th (for example, a black component picture --) Black development counter 54BK is performed one by one about each

lor-separation component picture of an operation. The toner image of convenience 4 color of a yellow toner image, a magenta toner image, a cyanogen toner image, and a black toner image is imprinted one by one in piles by the 56th page of a middle imprint object drum, and synthetic formation of the color picture corresponding to the target full color picture is carried out.

071] that in which the middle imprint object drum 56 has the elastic layer of the inside resistance to metal drum coating, and the surface of high resistance -- it is -- the photo conductor drum 51 -- contacting -- or -- approaching -- the photo conductor drum 51 and abbreviation -- a rotation drive is carried out with the same peripheral velocity at the clockwise rotation of ****, bias potential is given to a metal drum, and the toner image by the side of the photo conductor drum 51 is made to imprint to this middle imprint object drum side side by the potential difference with the photo conductor

072] The color toner picture by which synthetic formation was carried out is imprinted by the 56th page of the above-mentioned rotation middle imprint object drum in the field of the record material (imprint material) P sent in from the non-illustrated feed section to predetermined timing in this secondary imprint section T2 in the secondary imprint section T2 which is the contact nip section of this rotation middle imprint object drum 56 and the imprint roller 55. The imprint roller 55 carries out the package imprint of the synthetic color toner picture from the 56th page side of middle imprint object drum one by one to the record material P side by supplying the charge of a toner and reversed polarity from the tooth back of the record material P.

073] It dissociates from the field of the middle imprint object drum 56, and the record material P which passed the secondary imprint section T2 is introduced to fixing equipment A, and is discharged as a color picture formation object in response to heating fixing processing of a non-established toner image by the delivery tray which is not illustrated outside the plane].

074] Fixing equipment A is fixing equipment of the electromagnetic-induction heating method according to this invention, for example, is fixing equipment of the first or the second or third example.

075] The rotation middle imprint object drum 56 after the color toner image imprint to the record material P is cleaned by the cleaner 58 in response to removal of the adhesion residues, such as the imprint remaining toner and super powder. Always, this cleaner 58 is held in the non-contact state at the middle imprint object drum 56, and is held in the contact state at the middle imprint object drum 56 in the secondary imprint execution process of a color toner picture over the record material P from the middle imprint object drum 56.

076] Moreover, always, the imprint roller 55 is also held in the non-contact state at the middle imprint object drum 56, and is held in the contact state through the record material P at the middle imprint object drum 56 in the secondary imprint execution process of a color toner picture over the record material P from the middle imprint object drum 56.

077] In addition, image heating apparatus, such as heating support **** record material, reforming front-face nature, such as gloss, or carrying out assumption arrival of the picture, is also contained in the fixing equipment of this invention.

078] Effect of the Invention] According to this invention, the efficiency beyond it is acquired, there is no generating of the micro gross which starts quickly, and the feature that sufficient separability ability is securable etc. can be made to provide also to equivalent to the fixing equipment of the heat mechanical control by roller which used the halogen heater about the fixing equipment of an electromagnetic-induction heating method, or the media which is easy to coil around a fixing roller like OHT, as explained above. Moreover, by having had a means by which a fixing roller and a pressurization roller did not slip, it can prevent that a fixing roller and a pressurization roller slip even if not stabilized or outer-diameter change of the peripheral speed of a fixing roller, and generating of the remains of a slip to the bad influence to the image formation resulting from a slip and a picture etc. can be lost.

NOTICES *

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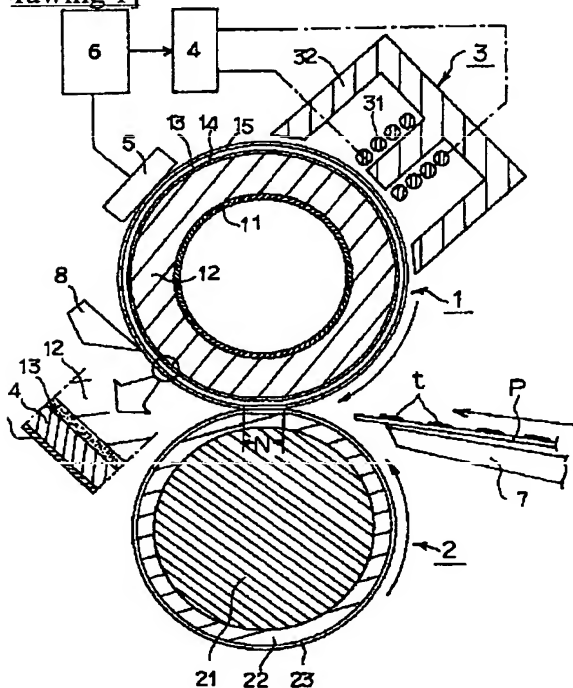
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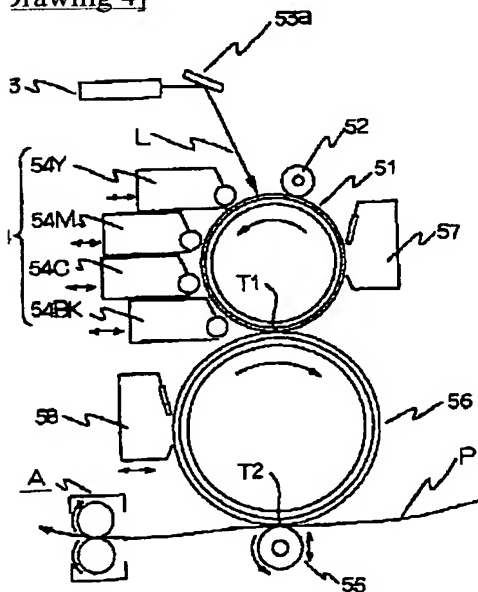
In the drawings, any words are not translated.

DRAWINGS

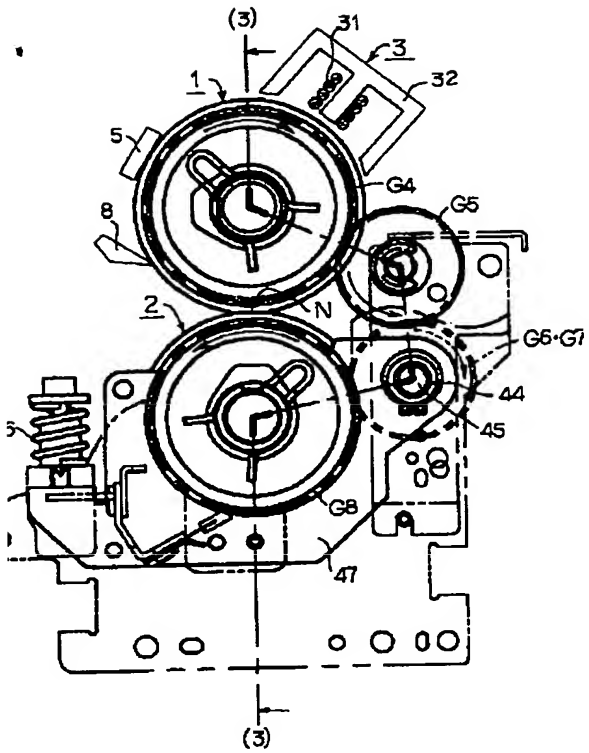
Drawing 1]



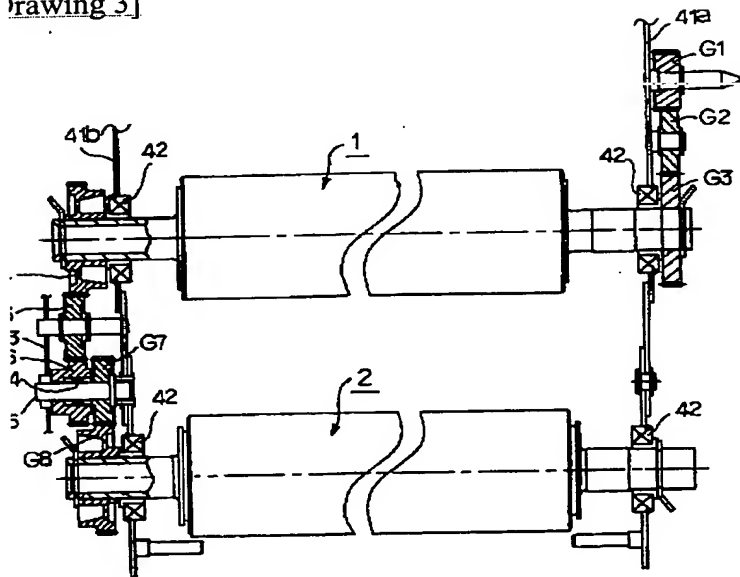
Drawing 4]



Drawing 2]



rawing 3]



[ranslation done.]